

## ABSTRACT

The present invention relates to an integrated optical ring resonator waveguide surrounded by an upper bus and a lower bus waveguide. A first resonant and intense optical wave is coupled into the upper bus whereas a second resonant optical wave is coupled into the lower bus. These resonant waves propagate from one bus to the other through the resonator in opposite directions. The first wave modulates the core refractive index of the resonator (Kerr effect) and thereby shifts the resonant conditions of the resonator. This results in the amplitude modulation of the second wave at its non-resonant port. Through this process, the optical amplitude modulation pattern of the first wave is transferred to the second wave. Optical wavelength switching is achieved when the waves have different wavelengths. In alternative embodiments and methods of driving the resonator, the resonator can achieve filtered wavelength tuning, add-and-drop multiplexing, space switching and intensity modulation.